# PA FFA

# Small Gas Engines CDE

# Part I - Written Test

# Question Bank

1. What two things does the carb mix together?
    a. Water and Air
    b. Fuel and Air
    c. Oil and Fuel
    d. Fumes and Air
2. What do you call the brass (golden) plate inside the main passage of the carb body? It is also referred to as the butterfly.
    a. Choke Plate
    b. Gas Plate
    c. Throttle Plate
    d. Carburetor Door
3. What kind of cylinder wall finish will you find on the Briggs and Stratton 130G32 (our contest engine) from the factory?
    a. Cross Hatch
    b. Diamond Bore
    c. Smooth Finish
    d. Glazed
4. What are the sharp peaks created by honing that will be removed during the ‘break-in’ process?
    a. Mountains
    b. Burrs
    c. Asperities
    d. Appalachians
5. Which ring is both oil control and a secondary block to compression?
    a. Compression Ring
    b. Wiper Ring
    c. Oil Ring
    d. Distribution Ring
6. Which ring is concerned with providing a seal between the piston and the cylinder walls?
    a. Compression Ring
    b. Wiper Ring
    c. Oil Ring
    d. Distribution Ring
7. What material are most piston rings made out of?

a. Steel
b. Cast Iron
c. Aluminum
d. Brass

8. Compressing a gas increases its molecular activity. This increase in activity is expressed as _____ .
    a. Vibration
    b. Cooling
    c. Heat
    d. Smoke
9. What design offers a quieter running engine by reducing piston wobble and related noise.
    a. Offset Piston Pin
    b. Injection Lubrication
    c. Overhauled Muffler
    d. Center Aligned Piston Pin
10. Exhaust smoke can be caused by _____ .
    a. Overheating and catching fire
    b. Dyed Oils (blue, red, etc.)
    c. Oil mist traveling past the rings
    d. Increase of crankcase vacuum
11. After an engine overhaul, blue smoke most likely indicates _____.
    a. The wrong oil being used
    b. The wrong jetting in the carb
    c. The Wiper Ring installed upside down
    d. The Oil ring installed upside down
12. Which engine component changes rotary motion into linear motion for actuating valve movement.
    a. Push Rods
    b. Tappets
    c. Rockers
    d. Cam Lobes
13. Valve Overlap occurs at TDC between which two strokes?
    a. Intake and Compression
    b. Compression and Exhaust
    c. Combustion and Compression
    d. Exhaust and Intake
14. How many times will the piston reach TDC during a complete 4-stroke cycle?
    a. Once
    b. Twice
    c. Four
    d. Eight
15. What are the two valves called?
    a. Intake and Exhaust

b. Breather and Reliever
c. Left Oriented and Right Oriented
d. Open and Closed

16. A mechanical compression release system found on the camshaft incorporates a weighted lever that lifts which valve off the valve seat during engine startup?
    a. Intake
    b. Left Oriented
    c. Exhaust
    d. Breather
17. What is the purpose of the Compression Release System found on the camshaft?
    a. To eliminate the possibility of pressure build up in the crankcase while running
    b. To reduce the force required to pull the starter rope or load on the starter motor
    c. To allow excess pressure to leak out of the crankcase during operation
    d. To manually initiate the leak-down test procedures
18. Valves are typically made of _____ which is similar to stainless steel.
    a. Carbon Steel
    b. Mild Steel
    c. Austenitic Steel
    d. Weathering Steel
19. All modern day OHV engines are built with _____ degree intake and exhaust valve angles.
    a. 15
    b. 30
    c. 45
    d. 62
20. What is the volume swept by the piston as it travels from top dead center to bottom dead center?
    a. Engine Displacement
    b. Stroke Length
    c. Bore Size
    d. Compression Ratio
21. How many revolutions does the crankshaft need to make to complete one whole engine cycle of 4-strokes?
    a. 180 deg. or a half turn
    b. 360 deg. or one complete turn
    c. 720 deg. or two complete turns
    d. 1440 deg. or four complete turns
22. There are three conditions necessary for engine operation. Which of the following is NOT required?
    a. Spark
    b. Compression
    c. Speed
    d. Fuel
23. Which is more combustible, or likely to ignite?

a. High octane liquid gas
b. Low octane liquid gas
c. Compressed fuel vapors
d. Exhaust Fumes

24. What is the main purpose of the carburetor?
a. Create spark
b. Mix fuel and air
c. Attach the connecting rod
d. Force air into the crankcase

25. What is the purpose of the finger guard?
a. To make the spark
b. To cover the flywheel
c. To check the oil level
d. To hold all the parts in place

26. A feeler gauge can be used to
a. Measure the stroke length
b. Measure the valve tappet clearance
c. Measure the armature air gap
d. Both b and c

27. The air filter
a. Filters particles such as dirt out of the air
b. Is attached to the intake side of the carburetor
c. Can be paper, dry, or wet sponge depending on model type
d. All of the above

28. At the end of which stroke is the air and fuel mixture ignited?
a. Intake
b. Compression
c. Power / Combustion
d. Exhaust

29. How many rings are commonly found on a small gasoline engine piston?
a. 1
b. 2
c. 3
d. 4

30. Top dead center _____ .
a. Happens when the piston is at the bottom of the cylinder
b. Happens when the piston is at the top of the cylinder
c. Neither A or B
d. Both A and B

31. Which part(s) of the engine is responsible for the timing of the valves?
a. Piston, connecting rod
b. Spark plug, armature
c. Flywheel and flywheel nut
d. Crankshaft and camshaft timing gears

32. During which two strokes are both valves closed?
    a. Combustion and Compression
    b. Compression and Exhaust
    c. Intake and Compression
    d. Intake and Exhaust
33. How many sparks will occur during a complete 4-stroke engine cycle?
    a. One - 1
    b. Two - 2
    c. Four - 4
    d. Eight - 8
34. Some fuel sticks to the intake port during the intake stroke.
    a. True
    b. False
35. Vertical shaft engines feature a crankshaft that is placed horizontally when the engine is mounted to its application.
    a. True
    b. False
36. How often does a 4-stroke engine make power to turn the crankshaft?
    a. Once every 2 revolutions
    b. Every revolution
    c. Every 90 degrees
    d. None of the above
37. The spark for ignition occurs when?
    a. The valves close
    b. The magnet moves past the ignition armature
    c. Beginning of the compression stroke
    d. During overlap
38. The camshaft lobes control what function?
    a. How far the valve opens and for how long
    b. Engine speed
    c. The governor
    d. The carburetor
39. The flywheel creates inertia.
    a. True
    b. False
40. The camshaft turns at what speed in relation to the crankshaft?
    a. 1 : 1
    b. Half
    c. 3 / 4
    d. Twice
41. The two common cylinder wall finishes that are used on Briggs & Stratton engines are:
    a. polishing
    b. diamond bore & crosshatch
    c. polishing & diamond bore

d. None of the above

42. Which color of engine smoke can indicate an overly rich fuel mixture?
    a. Blue
    b. White
    c. Grey
    d. Black
43. The simplest way to isolate crankcase breather problems is by _____ or leak-down testing.
    a. Compression testing
    b. Testing by spinning the flywheel backward
    c. Holding the breather tube closed
    d. Testing for crankcase vacuum
44. A valve seat can be damaged from:
    a. Carbon deposits
    b. Corrosive combustion chemicals
    c. Debris
    d. All of the above
45. Which ring provides a controlled film of oil to lubricate the compression ring?
    a. Compression
    b. Oil Control
    c. Expander
    d. Wiper
46. The narrower the valve margin, the longer the valve life.
    a. True
    b. False
47. The air/fuel charge enters the combustion chamber in a ____ state.
    a. Solid
    b. Liquid
    c. Vapor
    d. none of the above
48. Which ring prevents the majority of the expanding compression gases from getting past the piston into the crankcase?
    a. Oil Control ring
    b. Wiper ring
    c. Compression
    d. O-ring
49. During the compression stroke, what is the position of the intake valve?
    a. Open slightly
    b. Closed slightly
    c. Stops the exhaust from going into the carburetor
    d. Fully closed
50. During the power stroke, the expanding gasses force the top ring on the piston against the cylinder wall.
    a. True

b. False

51. _____ is a toxic gas produced by incomplete combustion of gasoline or other hydro-carbon fuels.
    a. Helium
    b. Hydrogen
    c. Carbon Monoxide
    d. fuel vapor
52. Gasoline blended for use in the winter is highly volatile compared to gasoline blended for summer use
    a. True
    b. False
53. A pilot jet is a carburetor component that meters the flow of air into the idle circuit of the carburetor.
    a. True
    b. False
54. The _____ ratio is the specific air-fuel ratio (by weight) of atmospheric air to fuel at which the most efficient and complete combustion occurs
    a. lambda factor
    b. compression
    c. stoichiometric
    d. 9.7:1
55. Adding 10% alcohol to fuel causes an engine to produce more power.
    a. True
    b. False
56. What governing systems typically exhibit the widest governor droop for applications?
    a. Mechanical
    b. Electronic
    c. Pneumatic
    d. Load
57. What position does the governor spring hold the throttle plate when the engine is not running?
    a. Closed
    b. Open
    c. ¼ Open
    d. ½ Open
58. The governor spring is directly connected to the throttle plate.
    a. True
    b. False
59. Mechanical idle stops will always be set to a higher speed than the engine idle speed.
    a. True
    b. False
60. After servicing the carburetor, a technician is performing a complete governor system adjustment. The governor system on the engine has two springs: the governed idle

spring and the normal primary governor spring. Which of the two speed settings is adjusted first?

a. The top no-load speed
b. The governed idle speed
c. Either can be adjusted first
d. All engine speeds are preset

61. What symptom will be exhibited on an engine equipped with a pneumatic governor system if the cooling fins are plugged?
    a. Engine speed will rise
    b. Engine performance has slow response
    c. Engine performance can respond faster to a load
    d. The RPM decreases
62. An over lean fuel mixture can cause hunting and surging.
    a. True
    b. False
63. Some Briggs & Stratton governor systems feature a governed idle. What performance benefit does this feature provide?
    a. Keeps the engine from over heating
    b. Allows the user to apply a full load to the engine
    c. Accept light to medium loads at slower or idle throttle positions
    d. Run for a long life
64. What types of governing systems do Briggs & Stratton engines offer?
    a. Mechanical
    b. Load
    c. Pneumatic
    d. All Of The Above
65. What is the relationship between the governor and the throttle? Technician A says that it is the throttle shaft that moves the governor lever. Technician B says that the governor lever moves the throttle shaft. Who is correct?
    a. Technician A
    b. Technician B
    c. Both Technician A & B
    d. Neither Technician A & B
66. Which of the following is the most accurate definition of governor droop?
    a. Variation in RPM between top no load speed and the maximum power output
    b. The increase in speed before the engine performs work
    c. The decrease in engine speed after the engine begins to stop performing work
    d. The difference between engine speed at curbed idle and when the speed control is moved to top no load speed
67. What holds the throttle shaft in the idle position?
    a. A Spring
    b. The speed sensing component
    c. A brass bushing
    d. A Governed Idle spring

68. The governor spring is the only force on the throttle shaft when the engine is not running.
    a. True
    b. False
69. Which governor component applies force to the throttle shaft in an effort to move it to the wide open throttle (WOT) position?
    a. The air vane
    b. The governed Idle spring
    c. The governor spring
    d. The flyweights
70. No damage can occur from an engine with the incorrect speed setting.
    a. True
    b. False
71. What is another proper name for a pneumatic governing system?
    a. Wind turbine
    b. Air paddle
    c. Wind vane
    d. Air vane
72. What position should the speed control be in when adjusting the governor?
    a. Idle position
    b. Curb idle position
    c. Transition speed
    d. Fast or wide-open throttle position
73. 4-stroke engines come in two variations: Vertical and _____.
    a. Horizontal
    b. Heavy duty
    c. Reverse
    d. Brake-Blade-Clutch
74. Add alcohol to gasoline to adjust the Reid Vapor Pressure.
    a. True
    b. False
75. All modern day small engine fuel delivery systems are calibrated for what Ethanol content?
    a. E10
    b. E15
    c. E30
    d. E85
76. Alternators were added to engines to:
    a. Recharge batteries
    b. Power additional electrical accessories
    c. Enhance customer features and benefits
    d. All of the above
77. The _____ and crankcase cover are the main supports for the crankshaft.
    a. Cylinder head
    b. Flywheel

c. Engine cylinder assembly
d. Oil seals

78. The _____ area is subjected to more thermal expansion than other areas of the piston.
    a. Piston pin
    b. Piston ring lands
    c. Piston crown
    d. Piston skirt
79. As the face of the oil control ring wears, the contact points become:
    a. Smaller
    b. Egg shaped
    c. Narrower
    d. Wider
80. As the spark plug center electrode wears down, the voltage required to fire the plug increases.
    a. True
    b. False
81. Automatic choking systems are meant to simulate EFI-like starting conditions on carbureted engines.
    a. True
    b. False
82. Because the governor is constantly adjusting the throttle plate position in response to changing engine load, you would expect the _____ will wear out considerably faster than the choke shaft.
    a. Governor linkage
    b. Throttle shaft
    c. Governor spring
    d. Throttle plate
83. The BEST engine lubricant for 4-stroke engine is:
    a. Manufacturer's recommended oil
    b. 30W motor oil with additives
    c. 10W40 motor oil
    d. 10W30 motor oil
84. The bottom ring on a four-cycle engine works to control:
    a. Piston slap
    b. Excessive compression
    c. Oil application to cylinder
    d. Piston / cylinder clearance
85. Burned oil deposits underneath the piston crown indicate:
    a. Engine overheating
    b. Correct oil viscosity
    c. High oil consumption
    d. A rich fuel mixture
86. A carburetor's venturi increases air speed and reduces _____.

a. Flutter
b. Hysteresis
c. Pressure
d. Volume

87. The carburetor venturi:
    a. Decreases air pressure
    b. Is larger than the intake opening
    c. Decreases air velocity
    d. Forces fluid into the float bowl
88. Common governor types on small engines include:
    a. Air vane, mechanical, and electronic
    b. Air fin and direct drive
    c. Flywheel and centrifugal
    d. Hydraulic and centrifugal
89. The Consumer Products Safety Commission safety standard requires that the blade of a rotary lawnmower must stop when the operator leaves the operating zone within:
    a. 1 second
    b. 2 seconds
    c. 3 seconds
    d. 5 seconds
90. A crankcase breather system:
    a. Allows air to enter and exit the crankcase
    b. Allows air to enter the engine only
    c. Cleans air entering the crankcase
    d. Allows positive pressures to exit the crankcase and maintain vacuum
91. _____ describes the ability of a fuel sample to resist knock and ping.
    a. Cetane
    b. Heptane
    c. Octane
    d. Stoichiometry
92. An engine that runs fine for 5 minutes and then stops, but restarts after 2 minutes may indicate what condition?
    a. Carburetion issues
    b. Improperly functioning gas cap vent
    c. Broken governor spring
    d. Low on oil
93. Engine valve overlap is most useful at _____.
    a. The transition from the carburetor low speed circuit to the high-speed circuit
    b. Higher engine speeds
    c. Engine startup
    d. Acceleration under heavy loads
94. Maximum valve overlap occurs:
    a. Before top dead center
    b. After top dead center, intake stroke

c. At top dead center, exhaust stroke
d. Before bottom dead center

95. An engine with a longer stroke produces more torque than an engine with a shorter stroke and the same displacement.
    a. True
    b. False
96. An engine with a relatively high compression ratio must use fuel with a:
    a. High octane rating that burns slowly
    b. High octane rating that burns quickly
    c. Low octane rating that burns slowly
    d. Low octane rating that burns quickly
97. Fuel blends change throughout the year in regions with large climate changes to aid in engine startability.
    a. True
    b. False
98. Heat always flows from an area of lower temperature to an area of higher temperature.
    a. True
    b. False
99. Hunting and surging under load indicates a problem with the _____.
    a. Governor system
    b. Fuel pump
    c. Carburetor System
    d. Choke cable adjustment
100. If abrasives get past the air filter, they may continue to travel _____.
    a. Through the carburetor
    b. Past the valves
    c. To the cylinder
    d. All of the above
101. If the customer does not have a copy of the original purchase receipt, what should the dealer use as the default purchase date?
    a. The date the person brings the piece of equipment in to the dealer for repair
    b. The equipment model and serial number
    c. The engine date code (date of manufacture)
    d. The date that the customer tells you that they remember purchasing the equipment
102. If the flywheel key shears on an engine equipped with an ignition armature, the armature will continue to create energy and a spark at the spark plug but at the wrong time.
    a. True
    b. False
103. If the oil is not changed on a routine basis, contamination build-up will continue until _____ begins to form.
    a. Metal flakes
    b. Nitrates

c. Sludge
d. Water

104. In a float bowl type carburetor the needle and seat perform what function?
a. Controls mixture
b. Allows for mid-range operation
c. Maintains engine speed
d. Controls fuel flow into the carburetor bowl

105. In higher altitude locations, most engines require a carburetor jet change.
a. True
b. False

106. Intake and exhaust valves are cooled by transferring most of their heat through the:
a. Valve guide and lifter
b. Valve guides, lifter, and came lobe
c. Valve guides
d. Valve seats

107. _____ of the oil will eventually result in an extremely viscous material, such as tar, which has little or no lubrication ability.
a. Expansion
b. Thermal cracking
c. Hydrocarbon ionization
d. Thermal stability

108. A pilot jet provides _____ for the circuit.
a. Better acceleration
b. Fuel
c. Nothing
d. Enhanced atomization

109. The piston head is exposed to a great deal of heat from the combustion process. Most of this heat transfers to the cylinder walls by the _____.
a. Piston offset
b. Oil film
c. Compression ring
d. None of the above

110. Normal and acceptable leakage of compression gasses is greater than leakage caused by alignment of (unworn) piston ring end gaps.
a. True
b. False

111. Piston ring end gap is the distance between the:
a. Side of the ring and the piston ring groove
b. Ends of the ring when squarely positioned in the cylinder
c. Ring and cylinder wall when installed in the cylinder
d. Compression and oil ring

112. Reid Vapor Pressure is a measure of the fuels:
a. Volatility
b. Storage Time

c. Octane rating
d. Structure

113. A sheared flywheel key on a walk behind mower is most likely the result of:
a. Overspeeding
b. Sudden stopping of the crankshaft
c. Too many starting attempts
d. None of the above

114. What is the most common valve failure that affects compression?
a. Valve stem gets gummy
b. Degradation of the valve face and the valve seat surface
c. The intake and exhaust valve stay closed
d. The spark plug ignites 6 degrees of rotation before TDC

115. Often when the customer makes the statement that the engine is hard to start, it is an indicator of:
a. Unit is lacking fuel
b. customer pulls the rope too slowly
c. low power
d. None of the above

116. Which of the following rings are commonly found on Briggs & Stratton pistons? Select all that apply:
a. Oil control ring
b. Compression ring
c. Wiper ring
d. O-ring

117. What may be sufficient valve clearance at low temperature may become insufficient clearance at high temperature.
a. True
b. False

118. The _____ ring contacts the oil thrown out by the lubrication system and the crankshaft, wiping away large volumes of oil from the cylinder wall.
a. Wiper
b. Middle Ring
c. Oil Control
d. None of the above

119. Why must the "charge" in the combustion chamber be compressed before ignition?
a. Cools the charge to make it more dense
b. Improved vaporization of air and fuel
c. increases the volume of air
d. All of the above

120. When the intake valve opens the air passage to the carburetor, the higher outside atmospheric pressure flows into the lower pressure of the cylinder.
a. True
b. False

121. When an engine has a compression ratio of 6:1, it means that the volume of the crankcase is 1/6th as much when the piston is closest to the crankshaft than it is when the piston is furthest from the crankshaft.
    a. True
    b. False
122. The compressing of the charge does not aid the air/fuel flow into the combustion chamber.
    a. True
    b. False
123. The compression ratio of an engine is decreased when a large volume of combustion deposits accumulate in the engine.
    a. True
    b. False
124. If the exhaust valve face shows any signs of pitting, burning, or evidence of a valve seat impression, the technician should replace the valve.
    a. True
    b. False
125. Which of the following is MOST likely to cause a lack of power?
    a. A bent crankshaft
    b. Broken flywheel cooling fins
    c. Worn rings
    d. All the above
126. When does the warranty on the engine begin?
    a. The original date when the customer first used the piece of equipment
    b. The original date the engine was manufactured
    c. The original date that the OEM made the equipment that the engine is attached to
    d. The original date the customer purchased the equipment new
127. Valve overlap is built into the camshaft to help start which stroke?
    a. Power
    b. Exhaust
    c. Compression
    d. Intake
128. The octane rating of a fuel is a good indicator of how much power the fuel can deliver during oxidation.
    a. True
    b. False
129. Vaporization is the process in which liquid is sufficiently cooled to change states of matter from a liquid to a vapor.
    a. True
    b. False
130. A completely blocked high-speed air bleed can commonly cause an engine to run very rich under load.

a. True
b. False

131. Adding 10% alcohol to gasoline causes an engine to produce more horsepower.
a. True
b. False

132. For proper high-speed operation, the ignition process should begin at exactly TDC.
a. True
b. False

133. Which of the following is NOT a primary function of oil in the engine?
a. To clean by suspending dirt particles.
b. To help seal piston rings.
c. To reduce friction by maintaining a film of oil between moving parts.
d. To increase fuel volatility.

134. _____ are located around the cylinder bore and cylinder head to increase the surface area which increases heat transfer to the moving air.
a. Air jets
b. Cooling fins
c. Air ducts
d. Radiator fins

135. What is the common term used to describe the position of the piston when it is at its farthest distance from the cylinder head?
a. TDC
b. MDC
c. BDC
d. None of the above

136. Why must the air/fuel mixture drawn into the combustion chamber be compressed?
a. To better mix the fuel droplets with the air
b. To heat the mixture
c. To further vaporize the fuel
d. All of the above

137. What kind of adjustment should be performed if the carburetor, crankcase cover, or oil sump are removed and reinstalled?
a. Carb Overhaul
b. Idle Screw Adjustment
c. Valve Adjustment
d. Static Governor Adjustment

138. Which of the following is the most accurate definition of governor droop?

a. Variation in RPM between top no load speed and the maximum power output
b. The increase in speed before the engine performs work
c. The decrease in engine speed after the engine begins to stop performing work
d. The difference between engine speed at curbed idle and when the speed control is moved to top no load speed.

139. When performing and completing a static governor adjustment on a mechanical governor system, what is the relative position of the flyweights attached to the governor gear compared to the governor cup shaft? What is the relative position of the governor cup compared to the governor shaft?
a. The flyweights are fully retracted toward the governor gear shaft and the cup is in the fully extended position away from the base of the governor cup shaft
b. The flyweights are fully extended outward away from the governor cup shaft and the cup is fully retracted toward the base of the governor cup shaft
c. The flyweights are fully retracted toward the governor cup shaft and the cup is fully retracted toward the base of the governor cup shaft
d. Both the flyweights and the governor cup are fully extended away from the governor cup shaft

140. A torque wrench should be used:
a. Only on bolts, never on screws
b. On all fastener's as indicated in the repair manual
c. Only on head bolts and rod caps
d. Only during engine disassembly

141. Connecting rods in V-twin engines share the same crankpin journal for what reason:
a. Reduce piston slap
b. Staggered cylinders
c. Balancing
d. High RPM use

142. Which of the following is NOT a function of engine oil?
a. Reduces hydrocarbons
b. Cleaning
c. Lubrication of components
d. Cooling

143. Proper engine RPM is achieved most precisely by which governor system?
a. Engine load
b. Electronic

c. Air vane
d. Mechanical

144. Governor sensitivity is gained or lost by the mechanical advantage provided by the change in governor arm length.
a. True
b. False

145. Installation of an advancing armature in place of a standard armature can result in serious kickback.
a. True
b. False

146. Cast aluminum expands faster and with greater magnitude than cast iron alloy.
a. True
b. False

147. The piston and the cylinder (or cylinder sleeve) can not be the same material because they would ‘weld’ together under high heat.
a. True
b. False

148. Vapor lock is BEST described as:
a. Steam forming from water in the fuel tank
b. Fuel bubbles restricting the flow of fuel in the fuel system
c. Hot oil causing the engine to seize
d. Fuel filling the combustion chamber and stopping the piston

149. What is the optimum fuel/air ratio for gasoline?
a. 14.7 parts of air to 1 part of fuel
b. 17.4 parts of air to 1 part of fuel
c. 10.0 parts of air to 1 part of fuel
d. 15.5 parts of air to 1 part of fuel

150. Some engines have a carburetor equipped with a fuel cutoff solenoid. The primary purpose of this solenoid is to:
a. Cut off the fuel flow in case the product overturns
b. Prevent engine overspeeding
c. Prevent vapor lock
d. Control afterfire when the engine is shut off